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I, KIM MARSHALL, MANAGER EXAMINATION SUPPORT AND SALES, hereby certify that the annexed is a true copy of the Provisional specification in connection with Application No. PP 4832 for a patent by BAINS HARDING LIMITED filed on 23 July 1998.

WITNESS my hand this Fifth
day of August 1999

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INSULATION MODULE FOR VESSELS

The present invention generally relates to insulation technology used in industrial and other applications, and in particular, to an insulation module for insulating a vessel, and a method of installing the insulation module. The 5 present invention will be described with reference to its use on vessels used in chemical plants. It should however be appreciated that other applications of the insulation module are also envisaged.

In chemical plants, tanks and other vessels holding or carrying materials such as solids, gases or liquids generally need to be maintained within 10 controlled temperature limits for efficient use within the process being conducted within the chemical plant. One way of providing this temperature control is to provide insulation on the vessels and pipes of the plant.

The insulation of a chemical plant is however an expensive and time consuming process. In the case of vessels, a commonly used method of 15 installing the insulation is to initially embed a series of pins over the surface of the outer wall of the vessel with each pin extending laterally therefrom. The insulation material can then be supported on the pins, with a sealing washer being provided at the end of each pin to retain the insulation and any retaining mesh in position. An outer metal cladding is then installed over the top of the 20 insulation to provide protection for the insulation.

The current installation process therefore involves a series of steps. It is not however always possible to install pins, as for example in the case of thermally relieved vessels. Other means such as straps are then required to hold the insulation in position.

25 Furthermore, because the insulation material generally used is made of fibrous material such as, for example, fibreglass, the insulation of this material can pose a safety risk to the workers on site such that all non-insulation work must cease while the insulation is being installed. This may necessitate working in night environments where the cost of lighting and incidental costs of 30 employment are commensurately higher than during the day.

Furthermore, because the insulation material is installed immediately against the outer wall surface of the vessel, and because the insulation material

can retain moisture, this can potentially lead to corrosion problems for the vessel.

It is therefore an object of the present invention to avoid at least one of the abovenoted disadvantages of existing insulation systems.

5 With this in mind, according to one aspect of the present invention, there is provided an insulation module for a vessel including

a panel having an outer surface layer, and an insulation layer secured to the outer surface layer; and

mounting means extending from the panel for enabling mounting of the 10 insulation module on an outer wall of the vessel, wherein an air gap is provided between the insulation layer and the outer wall of the vessel when the insulation module is mounted thereon.

The provision of the air gap leads to a number of advantages:

(a) because the insulation layer is separated from the wall of the 15 vessel by the air gap, this minimises the possibility of corrosion due to the retention of moisture within the insulation layer.

(b) the air located within the air gap provides an additional insulation layer. This means that the insulation layer secured to the outer surface layer can be of a reduced thickness.

20 Furthermore, because the insulation layer is secured to the outer surface layer prior to insulation of the insulation module, the insulation layer can be treated to prevent the release of potentially hazardous fibres therefrom. For example, the insulation layer may be covered by material prior to securing to the outer surface layer. Alternatively, an adhesive paint may be sprayed on the 25 outer surface of the insulation layer to prevent or minimise the release of fibres from that layer prior to securing to the outer surface layer.

The outer surface layer is dependent on the requirements of the plant operator. For example, the outer layer may be a corrugated sheet such as "Spandeck" (trademark) or may be a flat sheet. This outer layer can be made of 30 steel or aluminium although other materials are also envisaged.

The insulation layer may be secured to the outer surface layer by securing means. For example, the insulation layer may be retained between the

outer surface layer and a support mesh. Fastening means may extend between the outer surface layer through the insulation layer to the supporting mesh. The fastening means may for example be in the form of a fixing screw extending from the outer surface layer and through the insulation layer and the support mesh. A 5 speed clip member may be secured to the free end of each fixing screw to retain the support mesh, and therefore the insulation layer in position against the outer surface layer.

According to another possible arrangement, the insulation layer may be adhered directly to the outer surface layer.

10 The mounting means may include a series of brackets secured to and extending from the outer surface layer towards the vessel wall when the insulation module is in an installed position. Each bracket may include a mounting leg for supporting the panel of the insulation module away from the vessel wall.

15 Vessels used in chemical plants typically have a series of cleats provided about the outer wall of the vessel to allow cladding to be fixed to the outside of the vessel. To this end, the bracket mounting legs may be secured to the cleats when installing each insulation module on the vessel. Each mounting can be bolted to or welded to a respective cleat. Alternatively, where no cleats are 20 provided, the bracket mounting legs may be welded directly to the vessel wall. Alternatively, fastening means may specifically be provided to secure the bracket mounting legs to the vessel wall. For example, a series of thread rod stubs may be welded to the vessel wall. Each bracket mounting leg may include at least one laterally extending foot having at least one opening therethrough to 25 accommodate a respective thread rod stub. A nut may then be screwed onto each thread and stub to hold the bracket, and therefore the insulation module in position.

The insulation layer may be made of a variety of different material and may be of different thickness. For example, rock wool, fibreglass, PIR foam or 30 PUR foam could be used for the insulation layer. The present invention is not restricted by the insulation material used in the insulation layer.

The insulation modules may be installed in an abutting or closely

adjacent relationship to form a matrix covering at least a substantial portion of the outer wall of the vessel and thereby provide the necessary insulation for that vessel. The present invention therefore eliminates the need to embed pins within the outer wall of the vessel. Furthermore, the installation procedure is a 5 less time consuming single step process. In addition, maintenance of the installation is facilitated because individual modules can be readily removed and replaced with new modules as so required.

According to another aspect of the present invention, there is provided a method of installing insulation on a vessel including mounting a plurality of 10 insulation modules in an abutting or closely adjacent relationship on an outer surface of the vessel, each insulation module including a panel having an outer surface layer, and an insulation layer secured to the outer surface layer, and mounting means extending from the panel for mounting the insulation module on the outer wall of the vessel, wherein the method includes securing the 15 mounting means to the vessel to thereby provide an air gap between the insulation layer and the outer wall of the vessel when the insulation modules are mounted thereon.

According to yet another aspect of the present invention, there is provided an insulated vessel including a series of insulation modules as described above 20 mounted in an abutting or closely adjacent relationship on an outer surface of the vessel.

The various aspects of the invention may be more completely understood from the following description of an example arrangement of the present invention with reference to the accompanying drawings in which:

25 Figure 1 is a cross-sectional view of an insulation module according to the present invention; and

Figure 2 is a detailed partial cross-sectional view of the insulation module of Figure 1 mounted on a vessel wall.

The insulation module 1 includes a panel having an outer surface layer 3 30 formed, for example, from at least one sheet of "Spandeck" (trade mark). The use of other sheet material is possible depending on client requirements. An insulation layer 5 is secured to the underside of the outer surface layer 3. This

insulation layer 5 can be of any one of a number of different materials. For example, the insulation layer 5 can be provided by sheets of rock wool covered by a material layer to prevent the release of fibres from the rock wool.

The insulation layer 5 is secured to the outer surface layer 3 by means of 5 a series of fixing screws 10 inserted through the outer surface layer 3 and the insulation layer 5. A sealing washer 11 is located between the head of the fixing screw 10 and the outer surface layer 3. A sheet of wire mesh 18 is provided on the opposing side of the insulation layer 5 to help to support that layer 5. An end of the fastening screw 10 extends through the wire mesh 18, and a speed clip 10 12 is attached to the end of each fixing screw 10 to hold the wire mesh 18, and therefore the insulation layer 5 in position.

The insulation module 1 further includes a series of brackets 7. Each bracket 7 includes an upper end 9 shaped to conform with the general profile of the Spandeck sheet 3. Adjacent sheets 3 overlap along their respective edge 15 portions. These sheets 3 are then secured to the bracket 7 by means of a further fixing screw 13 extending through the overlapping edge portions of the sheets 3 and the bracket upper end 9. A further sealing washer 14 is located between the head of the further fixing screw 13 and the Spandeck sheets 3.

Each bracket 7 further includes a mounting leg 8 which extends through 20 the insulation layer 5 and the wire mesh 18 and extends beyond the assembled panel 6 of the insulation module 1.

A series of cleats 16 are typically provided along the exterior surface 17 of the vessel wall 2. The bracket 7 of the insulation module 1 are spaced along the insulation module 1 and correspond with the spacing of the cleats 16 on the 25 vessel wall 2. The mounting leg 8 of each bracket 7 can then be secured to a respective cleat 16 to install the insulation module 1. The brackets 7 can be welded to or bolted to the cleats 16. Alternatively, where no cleats are provided, then the brackets 7 can be welded to the vessel wall 2.

A series of the insulation modules 1 can be installed in an abutting or 30 closely adjacent relationship over the outer surface 17 of the vessel wall 2 to thereby at least substantially cover the vessel wall and thereby provide the necessary insulation for that vessel. Because the bracket 7 extends beyond the

insulation module panel 6, an air gap 15 is provided between the insulation layer 5 and the vessel wall 2. This air gap 15 leads to the advantages described above.

It is also envisaged according to the present invention that the panel 6 of 5 the insulation module 1 be formed from an outer surface layer having an insulation layer bonded directly to the outer surface layer.

Modifications and variations may be made to the present invention or consideration of the disclosure by the skilled reader of this disclosure. Such 10 modifications and variations are considered to fall within the scope of the present invention.

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ABSTRACT

Described is an insulation module for a vessel used in a chemical plant. The module has an outer surface layer and an insulation layer secured to the outer surface layer. Mounting means extends from the panel and enables mounting of the insulation module on an outer wall of the vessel. An air gap is provided between the insulation layer and the outer vessel wall when the insulation module is mounted on the vessel.

Fig. 1



